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REMARKS/ARGUMENTS

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This Amendment is being filed in response to the final Official Action of August 22, 2006. The final Official Action rejects all of the pending claims, namely Claims 1-5 and 11-15, under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, and more particularly as including claimed subject matter that was not sufficiently described in the specification. In addition, the final Official Action rejects all of the pending claims under 35 U.S.C. § 102(e) as being anticipated by US Patent Application Publication No. 2004/0146014 to Hammons, Jr. et al.

As explained below, contrary to the allegations of the Official Action, Applicant respectfully submits that the claimed invention does in fact comply with the written description requirement, and is patentably distinct from Hammonds. Nonetheless, Applicant has slightly amended Claims 1, 3, 11 and 13 to more clearly define the claimed invention. In addition, Applicant has amended the specification to correct a number of inadvertent typographical and grammatical errors and minor omissions. In view of the amendments to the specification and claims, and the remarks presented herein, Applicant respectfully requests reconsideration and allowance of all of the pending claims of the present application. Alternatively, as the amendments to the specification and claims do not raise new matter or issues but merely correct minor inadvertent errors, or restate limitations already included in the amended claims, Applicants respectfully request entry of this correspondence for purposes of narrowing the issues upon appeal.

A.   *The Claimed Invention Satisfies the Written Description Requirement*

The final Official Action rejects all of the pending claims under 35 U.S.C. § 112, first paragraph, on two separate grounds. Each ground is accordingly separately addressed below.

1.   *Real-Valued Vector*

The final Official Action first rejects all of the pending claims under § 112, first paragraph, alleging that the specification of the present application does not sufficiently describe the claimed limitation "real-valued vector, free of imaginary components." In this regard, the

Official Action notes pages 21 and 22 of the specification denoting the vector $\mathbf{x}_{CD}$ as $\mathbf{x}_{CD} = [(\mathbf{x}^R)^T$ $(\mathbf{x}^I)^T]^T$, and explaining that $\mathbf{x}_{CD}$ is a real vector. The Official Action then asserts that, since $\mathbf{x}_{CD}$ is denoted as including an imaginary component part $\mathbf{x}^I$, the specification does not support a real-valued vector $\mathbf{x}_{CD}$ free of imaginary component parts. Applicant respectfully disagrees and submits that the Official Action appears to have misinterpreted the vectors $\mathbf{x}^R$ and $\mathbf{x}^I$, and when those variables constitute real and imaginary component parts.

As is readily understood by those skilled in the art, a complex number may have the form, $a + jb$. In the foregoing, variables a and b represent the real and imaginary parts, respectively, of the complex number; and j represents the imaginary unit. As is also readily understood by those skilled in the art, however, although a and b are real and imaginary parts of the complex number $a + bi$, a and b are in fact real numbers.

In the instant case, complex vector $\mathbf{x}$ may be represented as follows:

$$\mathbf{x} = \mathbf{x}^R + j\mathbf{x}^I$$

where the variables $\mathbf{x}^R$ and $\mathbf{x}^I$ are both real-valued vectors, and form the real and imaginary parts of complex vector $\mathbf{x}$. Also in the instant case, $\mathbf{x}_{CD}$ may be represented as follows:

$$\mathbf{x}_{CD} = \left[\left(\mathbf{x}^R\right)^T \ \left(\mathbf{x}^I\right)^T\right]^T$$

As can be seen, as $\mathbf{x}_{CD}$ is represented as a function of real-valued vectors $\mathbf{x}^R$ and $\mathbf{x}^I$, and does not also include an imaginary unit j, $\mathbf{x}_{CD}$ may itself be considered a real-valued vector. Thus, while $\mathbf{x}^I$ represents the imaginary part of complex vector $\mathbf{x}$, $\mathbf{x}^I$ does not also represent an imaginary part of vector $\mathbf{x}_{CD}$ since $\mathbf{x}_{CD}$ is not a complex vector.

Applicant therefore respectfully submits that the specification does in fact support $\mathbf{x}_{CD}$ being free of imaginary component parts ($\mathbf{x}^I$ being an imaginary component part of $\mathbf{x} - \mathbf{x}^I$ being multiplied by the imaginary unit j; but not an imaginary component part of $\mathbf{x}_{CD}$).

2.   *Real-Valued Vector*

The Official Action further rejects the pending claims under § 112, first paragraph, alleging that the specification does not support the phrases "actual values" and "actual symbols." Applicants respectfully disagree and submit that, even if the specification does not use the exact

aforementioned phrases, the specification need not literally describe the claimed subject matter (i.e., using the same terms or *in haec Verba*) to satisfy the written description requirement. MPEP § 2163.02. Nonetheless, Applicant has amended Claims 1, 3, 11 and 13 to remove the allegedly offending phrases. That is, Applicant has amended Claims 1, 3, 11 and 13 to now recite detecting values of symbols of which the space-time encoded data is formed, and then refer back to those symbols.

Applicant therefore respectfully submits that the specification not only supports the claims as previously presented, but also supports the claimed invention as amended.

For at least the foregoing reasons, Applicant respectfully submits that the rejections of all of the pending claims under § 112, first paragraph, are overcome.

B. *The Claimed Invention is Patentable over Hammons*

The Official Action further rejects all of the pending claims as being anticipated by Hammonds. Briefly, Hammons discloses a system and method for designing space-time codes to achieve full spatial diversity over fading channels. As disclosed, the system and method present general binary design criteria for phase shift keying or PSK-modulated space-time codes. In this regard, design criterion may include, for linear binary phase-shift keying (PSK) (BPSK) codes and quadrature PSK (QPSK) codes, the rank (i.e., binary projections) of the unmodulated code words, as binary matrices over the binary field.

According to one aspect of the claimed invention, as embodied in amended independent Claim 1, an apparatus is provided for a communication system in which space-time encoded data is transmitted at a first location and at least at a second location for communication to a receive station. As recited, the apparatus includes a decoder coupled to receive indications of received values of the space-time encoded data received at the receive station. The decoder is also for directly combining the received values of the space-time encoded data transmitted from different ones of the first and at least second locations to the receive station. Once directly combined, the received values of the space-time encoded data form a real-valued vector, free of imaginary component parts. The decoder may then further be for detecting values of symbols of which the space-time encoded data is formed, based upon the real-valued vector into which the received

values are directly combined.

In contrast to amended independent Claim 1, Hammons does not teach or suggest a decoder for <u>directly combining received values of space-time encoded data such that the combined values form a real-valued vector free of imaginary component parts, and for detecting values of symbols of which the space-time encoded data is formed, based upon the real-valued vector into which the received values are directly combined</u>. Hammons does briefly disclose a space-time decoder for decoding space-time codes. Hammons does not, however, disclose the manner by which the decoder decodes those codes, much less in a manner corresponding to that of amended independent Claim 1. Instead, as indicated above, Hammons is concerned with the design of space-time codes for multi-antenna communication systems. In fact, Hammons explicitly states that, "[t]he present invention is concerned primarily with the design of space-time codes rather than the signal processing required to decode them. In most cases, the decoding employs known signal processing used for maximum likelihood reception." Hammons, paragraph 56.

Applicant therefore respectfully submits that amended independent Claim 1, and by dependency Claims 2-5, is patentably distinct from Hammons. Applicant also respectfully submits that amended independent Claim 11 recites subject matter similar to that of amended independent Claim 1, including the aforementioned decoding features. As such, Applicant respectfully submits that amended independent Claim 11, and by dependency Claims 12-15, is also patentably distinct from Hammons, for at least the same reasons given above with respect to amended independent Claim 1.

For at least the foregoing reasons, Applicant respectfully submits that the rejection of all of the pending claims as being anticipated by Hammons is overcome.

CONCLUSION

In view of the amendments to the specification and claims, and the remarks presented above, Applicant respectfully submits that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues. As explained above, no new matter or issues are raised by this Amendment, and as such, Applicants alternatively respectfully request entry of this Amendment for purposes of narrowing the issues upon appeal.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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